

Application Serial No. 10/823,105
Reply to office action of July 16, 2007

PATENT
Docket: CU-3682

REMARKS/ARGUMENTS

Reconsideration is respectfully requested.

Claims 1 and 3-12 were pending before this amendment. By the present amendment, claims 1-7 are canceled without prejudice; claim 8 is amended; and new claim 13 is added. No new matter has been added.

In the office action (page 2), claim 7 stands objected to for containing informalities.

In this paper, claim 7 has been cancelled, and the limitations of claim 7 have been incorporated into claim 8. In the amended claim 8, the term --conductive layers-- is correctly recited as indicated by the examiner. Withdrawal of the objection is respectfully requested.

In the office action (page 3), claim 1 stands rejected under 35 U.S.C. §112, ¶ 2, as being indefinite.

In this paper, claim 1 has been cancelled, and a part of claim 1 has been amended into claim 8. In the amended claim 8, the wording "it periphery" has been corrected to --a periphery of the core-- as pointed out by the examiner. Withdrawal of the rejection on this ground is respectfully requested.

In the office action (page 3), claims 1 and 3-6 stand rejected under 35 U.S.C. §102(b) as being anticipated by (Yoshikawa) "Frequency Modulation Response of a Tunable Birefringent Mode Nematic Liquid Crystal Electrooptic Device Fabricated by Doping Nanoparticles of Pd Covered with Liquid-Crystal Molecules", *Japan Journal of*

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Applied Physics, vol. 41.

In the office action (page 5), claim 7 stands rejected under 35 U.S.C. §103(a) as being obvious over Yoshikawa as applied to claims 1 and 3-6, and further in view of U.S. Patent No. 4,701,024 (Kobayashi) and U.S Patent No. 909,605 (Asano).

In the office action (page 7), claims 8-12 stand rejected under 35 U.S.C. §103(a) as being obvious over Yoshikawa in view of Kobayashi and Asano, as applied to claim 7, and further in view of U.S. Patent No. 6,304,239 (McKnight). The "et al." suffix appearing in a reference name is omitted in this paper.

In response, claim 8 has been amended to incorporate all limitations of claim 7 and a part of claim 1. Claims 1-7 are now cancelled without prejudice.

The applicants respectfully submit that claim 8 as amended is not taught or suggested by Yoshikawa, Kobayashi, Asano, or McKnight, whether these references are considered individually or in combination, for the reasons below.

In the office action (page 7, lines 7-15), the examiner has stated that Yoshikawa in view of Kobayashi and Asano fails to teach claim 8 the following limitation:

—wherein a control circuit of applying voltage, while modulating at least frequency among frequency and voltage, is provided on the conductive layer for varying light transmittance of the liquid crystal layer, and

--wherein under a constant applied voltage, an electro-optical response is turned on by switching the frequency of applied electric field from low frequency to high frequency, and the electro-optical response is turned off by switching the frequency from high frequency to low frequency--.

Then, in the office action (page 7, line 16 to page 8, line 13), the examiner cites McKnight to allege that McKnight discloses the above-indicated limitations of claim 8 (not taught or suggested by Yoshikawa, Kobayashi, and/or Asano).

The applicants respectfully submit that McKnight drives liquid crystals by

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modulating the frequency (McKnight col. 15, lines 6-14 and 28-32). According to McKnight col. 15, lines 28-32:

"This [driving liquid crystals] can be achieved by using a dual-frequency electro-optic liquid crystal material and performing this **reset, or drive to off function**, by applying a short period of **high frequency voltage signal** to the common electrode 26." (emphasis added.)

As clearly seen from above, McKnight teaches that the electro-optical response at **high frequency** is to be turned **off**. In contradistinction to McKnight, in claim 8, the electro-optical response is turned **on** at high frequency and is turned **off** at low frequency. Accordingly, claim 8 is different from McKnight in its frequency dependence. Nowhere else in McKnight teaches that the electro-optical response is turned **on** at high frequency and is turned **off** at low frequency. Therefore, claim 8 is not obvious even if Yoshikawa, Kobayashi, Asano, and McKnight are combined. That is, whether Yoshikawa, Koabayashi, Asano are considered in combination with McKnight, not every limitation of claim 1 is still not taught or suggested.

In the last amendment filed in response to the final office action mailed December 4, 2006, the applicants have amended claim 1 (which is now cancelled) to limited the liquid crystal molecules by reciting specific compounds. In the amended claim 8, recital of the limitations relating to the specific compounds is not needed or necessary to overcome the present rejection for the reasons given below. Including those specific compound limitations to claim 8 would unnecessarily narrow the scope of claim 8.

In the final office action mailed December 4, 2006, the examiner pointed out that U.S. Patent No. 6,376,029 (Suzuki) allegedly discloses liquid crystal-soluble particles

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comprising: a core having nanoparticles and a protective layer having liquid crystal molecules or liquid crystal-like molecules provided on a periphery of the core, wherein the liquid crystal molecules comprising the protective layer are cholesteric liquid crystals.

However, Suzuki as understood utilizes the optical function of selective reflection derived from helical structure of cholesteric liquid crystals comprising the protective layer. The present invention, on the other hand, does **not** use optical functions such as the selective reflection but utilizes the compatibility improving function of the protective layer that allows core particles to disperse easily in the matrix liquid crystal.

Further, in Suzuki, only the cholesteric liquid crystals comprising the protective layer exhibit the function of selective reflection. In the present invention, however, the protective layer utilizes its compatibility improving function as well as the quantum size effect of the nanoparticle itself and the frequency dispersion characteristics of dielectric constant originated from the Maxwell-Wagner effect. Accordingly, the present invention also has an effect of improving driving characteristics of liquid crystal device element having matrix liquid crystals with nanoparticles dispersed. As described above, the present invention has completely different effects to achieve from those of Suzuki.

Therefore, the applicants respectfully submit that the liquid crystal device element recited in the amended claim 8 (in which the liquid crystal molecules are not limited to specific compounds) is not obvious even when Suzuki is considered individually or in combination with any of the cited Yoshikawa, Kobayashi, Asano, and/or McKnight references.

For the reasons set forth above, the applicants respectfully submit that claims 8-12, now pending in this application, are in condition for allowance over the cited

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references. Accordingly, the applicants respectfully request reconsideration and withdrawal of the outstanding rejections and earnestly solicit an indication of allowable subject matter.

This amendment is considered to be responsive to all points raised in the office action. Should the examiner have any remaining questions or concerns, the examiner is encouraged to contact the undersigned attorney by telephone to expeditiously resolve such concerns.

Respectfully submitted,



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